INVITED COMMENTARY

Educational Attainment as a Social Determinant of Health

Joseph Telfair, Terri L. Shelton

A review of the current literature on the relationship between health outcomes and level of education provides points for consideration by providers and policymakers wishing to address social and economic determinants of health and health disparities.

Historically, certain groups of people (mostly minorities, poor people, and those living in regions where care is geographically sparse) have had less access to health care and have been less likely to utilize the care available to them. Figuring out how best to address such disparities in health care continues to be of importance to providers, administrators, scientists, and policymakers. Knowledge of the social and economic determinants of the disparities is critical for building evidenced-based solutions for their mitigation [1]. The Centers for Disease Control and Prevention, drawing on a World Health Organization report [2], explains that the social determinants of health are the

> complex, integrated, and overlapping social structures and economic systems that are responsible for most health inequities. These social structures and economic systems include the social environment, physical environment, health services, and structural and societal factors. Social determinants of health are shaped by the distribution of money, power, and resources throughout local communities, nations, and the world [3].

The North Carolina Institute of Medicine (NCIOM) Task Force on Prevention in a 2009 report recognized that a person's level of educational attainment is strongly related to his or her well-being and health status [4]. David M. Cutler and Adriana Lleras-Muney summarized the evidence in a policy brief for the National Poverty Center (2007) [5]: they noted that the research showed that better-educated people have lower death rates from common chronic and acute conditions, even after adjusting for demographic and employment factors. Further, the differences in life expectancy for those with and without a college education has widened over time. Differences in health behavior cannot account for all of the differences in health outcomes between those with more education and those with less. The ways in which education affects health are complex and include

> interrelationships between demographic and family background indicators, effects of poor health in childhood, greater resources associated with higher levels of education, a learned appreciation for the importance of good health behaviors, and one's social networks [5].

Unfortunately, our system of mass public education does not work equally well for everyone. Those with poor academic performance are likely to have lower educational attainment. This in turn decreases upward mobility and affects a person's health status.

Early childhood education can instill lifelong beliefs and behaviors that promote good health outcomes. However, the likelihood that a child will experience interventions designed to instill those beliefs and behaviors depends on his or her social, educational, and economic circumstances [6]. Challenges to the development and implementation of effective early intervention programs and services are complex and multifactorial, but they can be mitigated by programs such as the Healthy Start program of the Department of Health and Human Services [7] and North Carolina Smart Start [8]. Access to such programs varies, and efforts to encourage greater participation are needed.

The health disparities between the more and the less educated are significant. In 1999, the age-adjusted mortality rate of high school dropouts ages 25 to 64 was more than twice that of those with some college [9]. Using data from the National Health Interview Survey and matching respondents with death certificates obtained through the National Death Index, Cutler and Lleras-Muney found that individuals with higher levels of education were less likely to die within 5 years of having been interviewed [10]. This association remained substantial and significant even after controlling for job characteristics, income, and family background. This suggests that policies that improve educational outcomes for individuals have the potential to substantially improve health.

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Positive Behavior Intervention and Support:
Improving School Behavior and Academic Outcomes

Heather R. Reynolds

As a student, did you ever get into trouble for your behavior? For a number of students, the irritation and anxiety of being "in trouble" are a reality of school. Whether as a result of cultural differences, behavioral health challenges or just a lack of experience in a new setting, many students in our public schools experience these unpleasant feelings every day, in a place they are mandated to go. The stress this produces can further exacerbate school difficulties.

Schools are constantly looking for ways to improve outcomes for students, and over the years teachers and administrators have tried a myriad of interventions to improve students' academic and social behavior. One strategy currently being employed in North Carolina is Positive Behavior Intervention and Support (PBIS). PBIS is an evidence-based framework for school improvement based on a structured problem-solving model [1]. Schools implementing PBIS are taught to collect and analyze data, especially data related to student behavior, in order to identify areas needing improvement. Once challenges have been identified, school teams work to identify, teach, and reinforce desired behaviors and to extinguish problem behaviors. Throughout this process, schools use their own data to inform the ongoing implementation of strategies and systems to improve school climate and academic performance. By improving student behavior, schools decrease disruptions in the learning environment, thereby giving teachers and students more high-quality instructional time. When PBIS is paired with the use of effective instructional strategies, schools experience improvements in student academic performance in addition to improvements in student behavior and overall school climate [2].

One of the hallmarks of PBIS is its emphasis on providing direct instruction regarding schoolwide behavior expectations. Rather than assuming that students arrive already in possession of the behavioral skills necessary to successfully function in a school environment, schools teach socially appropriate behavior to all students. When there is a uniform standard for behavior across school environments, consistency is improved, which further aids student success. Increased consistency and clear expectations serve to decrease anxiety and stress by making the environment predictable. Once school-wide behavior expectations are firmly established, schools are able to identify students who may need additional behavioral support to be successful. School teams identify the specific behavioral skills that students need to improve by reviewing data about these students' behaviors. Once the particular skills are identified, school staff may provide differentiated behavior instruction, opportunities to practice the needed skills through role play, or additional cues or reminders to the students about when they should use particular skills. Such support may take any of a variety of forms, including behavioral instruction in small groups, more frequent behavior coaching from adults, or a highly specific individualized plan tailored to address the support needs of one student. This type of multitiered instruction is considered best practice in schools across the country.

Schools in North Carolina that have implemented PBIS have experienced changes in school climate and student outcomes that are in keeping with national trends for PBIS implementation [2]. PBIS schools have realized reductions in office discipline referrals (trips to the principal's office for a behavior problem) and suspensions as well as improvements in academic performance [3].

There is a relationship between educational level and health for both chronic conditions and acute ones, but the magnitude of the relationship is generally greater for chronic conditions [1]. Among adults 25 years of age or older, an additional 4 years of education lowers 5-year mortality by 1.8 percentage points (from 11% to 9.2%); it also reduces the risk of heart disease by 2.2 percentage points (from 31% to 28.8%) and the risk of diabetes by 1.3 percentage points (from 7% to 5.7%) [5].

As we have noted, better-educated persons have lower morbidity from the most common acute and chronic diseases (heart condition, stroke, hypertension, high cholesterol, emphysema, diabetes, asthma, and ulcers) [5, 10]. Educational attainment has been shown to have a significant protective effect on the risk for stroke and myocardial infarction, independent of socioeconomic status and other cardiovascular risk factors. Researchers in the Department of Neurosurgery and Toshiba Stroke Research Center at State University of New York, Buffalo, evaluated the relationship between education level (12 years or more of education versus less than 12 years) and the incidence of fatal stroke, ischemic stroke, intracerebral hemorrhage, and myocardial infarction [11] in a cohort of 21,443 United States adults who had participated in 1 of 2 large survey follow-up studies. During a mean follow-up period of 15.2 years, the risk for all fatal strokes increased in persons who reported less than 12 years of education; those with less education also had higher risks of myocardial infarction and of fatal intracerebral hemorrhage [11]. In combination with higher income, higher levels of education can also protect against risk factors for atherothrombotic (coronary, cerebrovascular, and/or peripheral arterial) disease: In a large multinational study, Goyal and colleagues [12] found that attained education level was protective against risk factors such as obesity, smoking, hypertension, and baseline burden of vascular disease in high-income countries such as the United States, but not in countries where income was low or moderate.

PBIS schools in North Carolina have documented reductions in suspension rates over a 7-year period [3, 7]. After office discipline referrals for 1 outlier school in North Carolina were removed, during the 2010-2011 school year the mean office discipline referral rate was lower in PBIS schools in North Carolina than in PBIS schools nationally [3-6]. For North Carolina schools implementing PBIS with high levels of fidelity, the average achievement rate on end-of-year academic performance measures was higher in 2011 than it had been at the same schools in previous years [3]. And in 2011 the average graduation rate for high schools that had been implementing PBIS for at least 4 years was higher than the statewide graduation rate, not only for the general student population but also for students with disabilities [3]. Other schools implementing PBIS have shown improvements both in overall academic performance and in closing the achievement gap for underperforming groups [3]. More than 40% of schools across the state have received PBIS training, and as this proportion increases, these data trends are expected to continue. As implementation spreads and improves, schools will become places where students can thrive and grow because they no longer need to worry about getting into trouble. NCMJ

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People with more education are less likely to have diabetes [5, 10]. Diabetes is especially common among disadvantaged groups, including persons without a high school diploma. A study by Reither and colleagues [13] using Utah data from the Behavioral Risk Factor Surveillance System between 1996-1999 and 2004-2007 found significant inverse associations between educational attainment and the odds of having diabetes. Women with a college education were found to be 27% less likely than women with a high school education to have diabetes. Well-educated men and women exhibit lower rates of diabetes than those with less education, and these disparities have not changed appreciably over the past decade [13].

Those with more education are healthier both mentally and physically. They are substantially less likely to report that they are in poor health or are experiencing anxiety or depression [5]. Having an additional 4 years of education lowers the probability of reporting oneself to be in fair or poor health by 6 percentage points (from 12% to 6%) and reduces the number of days of work lost to sickness each year by 2.3 days (from 5.2 days to 2.9 days) [5]. Better-educated people report spending fewer days in bed or not at work because of disease, and they have fewer functional limitations [10]. In short, higher levels of education yield better health, and with each increase in level of education (eg, from high school to college, or college to graduate school), there appears to be a positive change in health status [5].

The fact that people who are better educated have lower morbidity rates from the most common acute and chronic diseases is due in part to the fact that education level and educational achievement play a role in determining what sort of job or career one has, which in turn directly correlates with one's financial or socioeconomic status. Education is perhaps the most basic component of socioeconomic status, because it shapes future occupational

Personalization to the Highest Power

Colleen C. Pegram

SandHoke Early College High School (SHECHS), nestled between a turkey plant and a hatchery off Highway 401 Business in Raeford, North Carolina, is 1 of 2 high schools in Hoke County. SHECHS is innovatively designed, and the other school is traditionally designed, but both have the same mission: that every student graduate from high school ready for college or a career in a globally competitive world and prepared for life in the 21st century. Both schools have high expectations of faculty to ensure that this educational mission is achieved, and both expect students to be active participants in their education.

There are distinct physical differences between the 2 schools. The traditional high school is sprawled across 2 city blocks and is attended by nearly 2,000 students, whereas SHECHS occupies only 1 of 3 buildings on a satellite campus of Sandhills Community College; students must apply for entrance, and total freshman enrollment each year is limited to 75 students. The total SHECHS enrollment in the 2012-2013 school year is 256 students. (Freshman enrollment originally was limited to 55 students and increased over time to the present limit of 75 students). Required high school classes are taught in 1 building, housing 9 classrooms, and students also take some college classes on the main Sandhills campus. The small satellite campus, small number of students, and small staff facilitate increased personalization—the tailoring of teaching methods, curriculum, and learning environment to meet the needs of individual learners.

State Superintendent of Public Schools June Atkinson has identified instructional improvement as one of the comprehensive strategies for remodeling public education in North Carolina in order to move the state forward. The North Carolina New Schools Project has identified personalization as 1 of 6 design principles that are essential for school success. SHECHS is using personalization as a launching pad to achieve its vision and accomplish its mission.

SHECHS recruits students whose caretakers, parents, or guardians have not earned a 2-year or 4-year college degree, and for the past 4 years such students have made up 77% of the freshman class at SHECHS on average. These students have been targeted with an eye to increasing their chances of graduating from high school and college. In the Early College program—a 5-year program that begins in 9th grade and includes a second senior year—students are given the opportunity to earn a 2-year college degree free of charge while they are earning their high school diploma.

To persuade SHECHS students that they can go to college and be successful, staff members must connect with them in ways that go beyond textbooks, test scores, and grades. Purposeful personalization is the best way to reach students. Staff members must be innovative in developing and sustaining positive relationships with students by providing them with effective academic support, using a variety of strategies for increasing students' academic success.

An intervention professional learning community has been set up at SCHECH, and the school's teachers and counselors participate in its monthly meetings, where the focus is on finding effective academic interventions for students needing additional help. The professional learning community looks for early warning signs that a student may not succeed, and as a team, the teachers and

opportunities and earning potential. Education also provides knowledge and life skills that allow better-educated persons to more readily gain access to information and resources that promote health [9].

Individuals 25 years of age or older who have an additional 4 years of education also report more positive health behaviors [5]. Cutler and Lleras-Muney note that having an additional 4 years of education reduces the risk that one will smoke from 23% to 12%. People with the additional education also are less likely to report excessive drinking (5 or more drinks in 1 day). Those with more education report drinking to excess 4 days per year on average, compared with 11 days per year for those with less education. The risk of obesity is also reduced for those with more education, from 23% to 18%, and they are at slightly less risk of using illegal drugs (4.9% versus 5.0%) [5]. The authors note that differences in health behaviors alone cannot explain all of the disparities in health outcomes between the better educated and the less educated. Nevertheless, Cutler and Lleras-Muney point out, "an almost linear negative relationship exists between mortality and years of schooling and between self-reported fair/poor health status and years of schooling" [5]. And for some outcomes (functional limitations and obesity, for instance) the positive impact of education is even greater for those with some postsecondary education [5].

The correlation between educational achievement and health declines after a person reaches about age 50 or 60 [5, 10]. Cutler and Lleras-Muney suggest several possible reasons for this [5, 10]. Although less educated people are less likely to survive into older age, those who do survive are relatively healthy. Therefore, they may have been more similar to those who are better educated. It is also possible that education has become more important to health outcomes only in recent years. Further, the association between education and health may decrease after adults retire.

There are multiple reasons for these associations between level of education and health outcomes, although it is likely that they are in part the result of differences in

counselors look for the root causes contributing to the lack of success and devise viable strategies for assisting the student and increasing effective student behaviors. An intervention pyramid, consisting of 4 tiers of intervention ranging from basic to intensive, is employed. For example, tier 1 includes teacher-student conferences and student reflection and goal setting; tier 2 includes peer tutoring and counselor consultation; tier 3 includes intervention team conferences and continued enrollment in high school courses but no college courses; and tier 4 includes a focus on high school diploma completion and graduation. Most students initially perceive intervention as "being fussed at" by the faculty. Only later on, when they become successful, do these students realize that the intervention was carried out because adults cared. SHECHS students are expected to do more than "just get by." Faculty do not allow students to fall through the educational cracks!

Intervention strategies are essential, and so is recognition of student achievement. Every month one "College-Ready Student of the Month" is selected in each grade 9 through 11. Similarly, a student in grades 12 and 13 is selected as "College Student of the Month." The bulletin boards are filled with news articles on student achievement. Recognition is a priority, not an afterthought.

Student involvement in the school decision-making process is also important. Students are included in the school improvement process. They provide input when teachers are hired. And students are allowed to select their afterschool activities.

The simplest personalization strategy is for all of the staff members (including the principal, administrative staff, teachers, counselors, college liaison, child nutrition staff, and custodian) to get to know all of the students. SHECHS accomplishes this with seminars, clubs, and tutoring. In addition, staff members greet students with a smile every day. Sitting down and talking with students at breakfast or lunch, playing a game of basketball with them, or strolling along the campus talking with them achieves more positive results than disciplinary measures such as suspensions or detentions could ever accomplish.

The focus on personalization at SHECHS has resulted in measurable student achievement. SHECHS has graduated 2 classes totaling 73 students. Of those who graduated, 52 earned both a high school diploma and an associate degree; 43 transferred to a 4-year university in North Carolina; 14 continued their studies at Sandhills Community College; 2 transferred to Fayetteville Technical Community College; 1 transferred to a dentistry career program; and 5 entered the workforce or enlisted in the military.

Is personalization everything? No—there are 5 additional New Schools Project design principles (www.newschoolsproject.org), and the North Carolina remodeling plan for public education includes 3 additional comprehensive instructional improvement strategies, all of which contribute to student success (www.ncpublicschools.org/ready/). At SHECHS, however, personalization is the foundation for continued student success. Personalization strategies have created a learning environment there in which everyone thrives and students are empowered to succeed. NCMJ

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behavior across education groups. The relationships that have been found between level of education and various health risk factors—smoking, drinking, diet/exercise, use of illegal drugs, household safety, use of preventive medical care, and care for hypertension and diabetes—suggest very strongly that people who are better educated have healthier behaviors, although some of these healthier behaviors may also reflect differential access to care. As we have mentioned, those with more years of schooling are less likely to smoke, to drink heavily, to be overweight or obese, or to use illegal drugs [5]. Interestingly, although they report having tried illegal drugs more frequently than do the less educated, they also report having given up using illegal drugs more readily [9, 10].

The effect of level of education on health seems to be the same for both men and women across most outcomes; depression is one of the few exceptions [5]. It is not known whether such exceptions are the result of biological sex differences, or of differences in the behavior of men and women. The effect of level of education on health also appears to the same for both whites and blacks, again with a few exceptions. Whites tend to experience more positive health benefits from educational advancement in reported health status; they are less likely to report being in fair or poor health than are blacks with the same level of education. Cutler and Lleras-Muney also found that the impact of additional years of education was greater for those not living in poverty than for those who were poor [5]. This highlights the interrelationships among those variables considered to be social determinants. Educational attainment alone is not an independent driving factor for improved health status. An individual with a 4-year college degree who is living in poverty might have considerably worse health than an individual with such a degree who is well off financially.

Many of the social factors that affect health have both independent and interactive effects. For example, people with higher incomes are more likely to live in safe, healthy

Links Between Early Educational Experiences and Later Achievement Outcomes

Elizabeth Pungello, Kelly Maxwell

The evidence is in: High-quality early learning experiences in childcare and preschool settings can have very long-lasting effects on educational achievement for individuals at risk for poor outcomes due to poverty—effects that persist all the way to graduation from college. Some of the best evidence for this was obtained in a study conducted here in North Carolina; it began in the early 1970s, and follow-up is still ongoing.

The Carolina Abecedarian Project is a randomized control trial of the effects of early education in a childcare setting for children raised in poverty. Half of the children in the trial were assigned to a group that participated in an early childhood program from infancy through age 5, and half were assigned to a control group; children in the control group experienced any combination of home and/or community childcare that their families needed and were able to obtain [1]. Four cohorts of children born between 1972 and 1977 participated. A total of 111 children were enrolled and randomly assigned to the treated or control group. The childcare program, housed at the Frank Porter Graham Child Development Institute in Chapel Hill, had many of the features that constitute high-quality care, such as good caregiver-to-child ratios, well-trained and well-compensated teachers, and a developmentally appropriate, individualized curriculum. The children who were in the program and control groups have been assessed in a series of follow-up studies—at age 12, age 15, age 21, and most recently age 30—which demonstrated that the early learning experiences offered to the children in the program group have produced long-term positive effects. Of the 111 originally enrolled, 57 were randomly assigned to the treated group and 54 were assigned to the control group. By age 5 (end of the program), 105 children were still participating in the study (4 were deceased, 1 was withdrawn, and 1 was found to be ineligible due to biological conditions not apparent at birth). At age 21, all 105 living and eligible study participants were located, 104 agreed to participate. In the most recent age 30 follow-up, 2 more participants had died, leaving 103 living and eligible. Of these, 101 participated at age 30 (52 in the treated group and 49 in the control group). The strong scientific features of the study (eg, randomized assignment, low attrition) allow for greater confidence in the findings.

Children in the program group entered elementary school with higher cognitive abilities than those of children in the control group [1] and also appeared to be more engaged with people and objects in their environment [2]—that is, they were more "ready" for school success. Then in primary and secondary school they consistently demonstrated higher academic achievement in both reading and math than did children in the control group [3], a difference that was maintained through young adulthood. Furthermore, when individuals who had been in the program group reached early adulthood, they were more likely to attend a 4-year college or university [4]. Exciting findings recently reported from the age 30 follow-up showed that not only were those who participated in the childcare program more likely to attend college, they were also 4 times more likely to remain in college and graduate than were those in the control group [5].

Given this evidence that early learning experiences can influence educational achievement for poor children, what are we doing now in North Carolina to increase the opportunities of young children living in poverty to receive high-quality early learning experiences? And what outcomes have been associated with those efforts?

One major initiative is the North Carolina Pre-Kindergarten (Pre-K) Program (formerly known as More at Four). The purpose of this state-funded program is to provide a high-quality educational experience in a class-

homes in good communities with high-quality schools. Persons who are poor are more likely to live in substandard housing or in unsafe communities. Their communities may lack grocery stores that sell fresh fruits and vegetables or lack access to outdoor recreational facilities where people can exercise. Children who grow up in poverty generally fare worse in school and end up, on average, with fewer years of education than those in families with higher incomes [1]. Health-related factors such as hunger, physical and emotional abuse, and chronic illness can lead to poor school performance [14]. All of these factors combine to shape a person's health experience across the lifespan.

What is known is that mitigation of many of the social determinants of health disparities and their consequences results from ongoing proactive efforts aimed at improving the overall quality of life of persons in at-risk groups, beginning early in life [15-17]. Some types of improvement efforts, such as the creation of jobs or the placement of parks or grocery stores, are beyond the scope of clinicians and other health care providers. However, ongoing efforts are being made to improve access to health care. For example, resources can be provided to expand health insurance coverage and health care in under-resourced communities.

Academic success is an excellent indicator for the overall well-being of youth and is a primary predictor and determinant of adult health outcomes [18-20]. Addressing the role of educational attainment early in a person's life is critical, and the earlier this begins the better. The Community Preventive Services Task Force, created by the US Department of Health and Human Services to evaluate evidence and make recommendations about effective community-based interventions, has recommended the

room setting the year before entry into kindergarten for children at risk of reduced school readiness because of such factors as low family income, low English proficiency, disability, or chronic health condition [6]. To date, more than 167,000 children have participated. A recent study conducted at the Frank Porter Graham Child Development Institute investigated the early school-readiness skills associated with participation in the Pre-K Program using a quasi-experimental study design and found that program participation is associated with higher school-readiness skills at kindergarten entry [6]. Children who participated in the Pre-K Program had better language/literacy skills (ie, knowledge of letters and words, phonological awareness, print knowledge) and better math skills (counting abilities and the ability to solve applied math problems) than did children who had not participated. These results demonstrate that this initiative to provide high-quality early learning experiences to North Carolina children at risk for poor achievement outcomes is improving the school-readiness skills of those children.

North Carolina has also emphasized quality by integrating a Quality Rating and Improvement System into its childcare licensing system (the North Carolina Star Rated License system). In addition, the state uses a range of resources and supports (eg, Smart Start, T.E.A.C.H. [Teacher Education and Compensation Helps] Early Childhood®) to promote quality improvement in early care and education settings. Last year's legislation changing the policy regarding which early care and education programs are eligible to receive childcare subsidy funding also emphasized quality, ensuring that children from low-income families receive high-quality early care and education [7].

North Carolina is a national leader in its work to ensure that young children have access to high-quality early learning opportunities. The Early Learning Challenge grant recently awarded to the state will help North Carolina continue to strengthen its early childhood system so that all children, particularly those with high needs, have access to high-quality early learning environments. Continuing efforts are needed to provide the high-quality early opportunities that will help *each* child in North Carolina grow up to be a productive, successful citizen of the state. NCMJ

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establishment of comprehensive, center-based programs for low-income children ages 3 to 5 years. Effective and evidence-based early childhood programs that support early learning opportunities result in improved school readiness, less grade retention, and fewer placements in special education classes [21]. Cutler and Lleras-Muney [10] and others [22, 23] also recommend that the quality of schools be improved. In addition, Cutler and Lleras-Muney promote policies to expand college attendance [5].

Schools can play an important role in promoting the health and safety of young people and helping them establish lifelong healthy behaviors. Studies suggest that school health programs can have positive effects on educational outcomes, health-risk behaviors, and health outcomes [22, 24]. Similarly, programs that are primarily designed to improve academic performance are increasingly recognized as being important public health interventions [11, 13]. Leading national education organizations recognize the close relationship between health and education, as well as the need to foster health and well-being within the educational environment for all students [19-21, 25, 26]. NCMJ

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